CLAIMS

What is claimed is:

1. A coating composition comprising a fluoropolymer composition and a coating base, wherein the fluoropolymer composition comprises a fluoropolymer and an organic solvent and further wherein the fluoropolymer comprises repeating units in any sequence of polymer units:

I: $[R_f—X—Y—C(O)—CZ—CH_2]_a$ —

II: $[R_f—X—Y—C(O)—CH\text{-}CH_2]_b$ —

III: $[CCl_2—CH_2]_c$ —

IV: $[R^1—O—C(O)—C(CH_3)—CH_2]_d$ —

V: $[R^1—O—C(O)—CH—CH_2]_e$ —

VI: $[R^2—Y—C(O)—CT\text{-}CH_2]_g$

wherein

R_f is a straight or branched perfluoroalkyl group having 2-6 carbon atoms, which is optionally interrupted by at least one oxygen atom, or a mixture thereof of two or more thereof;

X is an organic divalent linking group having from about 1 to about 20 carbon atoms, optionally containing a triazole, oxygen, nitrogen, or sulfur, or a combination thereof;

Y is O, S or N(R) wherein R is H or C_1 to C_{20} alkyl;

Z is a straight or branched alkyl group having from about 1 to about 4 carbon atoms, or halide;

R^1 is a straight or branched alkyl group having from 12 to 22 carbon atoms;

a is a positive integer;

b is a zero or positive integer;

c is a positive integer;

d is a positive integer;

e is a zero or positive integer;

g is zero or a positive integer;

T is H, a straight, branched or cyclic alkyl group having from about 1 to about 10 carbon atoms, or halide;

R^2 is H, C_nH_{2n+1}, C_nH_{2n-1}, C_mH_{2m}—$CH(O)CH_2$, $[CH_2CH_2O]_pR^3$, $[CH_2CH(CH_3)O]_pR^3$, $[C_mH_{2m}]N(R^3)_2$;

n is from about 8 to about 40;

m is 1 to about 40;

each R^3 is independently H, CH_2OH or C_qH_{2q+1};

p is 1 to about 200;

q is 0 to about 40; and

provided that

1) repeating unit I, $[R_f—X—Y—C(O)—CZ—CH_2]_a$ — , is present in the fluoropolymer at a minimum of about 30% by weight of the fluoropolymer,

2) repeating units I, II and III, $[R_f—X—Y—C(O)—CZ—CH_2]_a$— , $[R_f—X—Y—C(O)—CH\text{-}CH_2]_b$— and $[CCl_2—CH_2]_c$— are present at a minimum combined total of about 50% by weight of the fluoropolymer; and

3) the total of all repeating units, I – VI plus any optional monomers equals 100% by weight of the fluoropolymer.

2. The coating composition according to claim 1 wherein R_f is C_6F_{13}—, and is a straight or branched alkyl, or a combination thereof.

3. The coating composition according to claim 1 wherein the subscripts a, c, and d are each independently from 1 to about 10,000 and wherein the subscripts b, e, g and h are each independently from 0 to about 10,000.

4. The coating composition according to claim 1 wherein R^1 is stearyl (octadecyl), $CH_3(CH_2)_{17}$, and wherein R^2 is an alkyl group containing 8 to 20 carbon atoms.

5. The coating composition according to claim 1 wherein the organic solvent is methyl isobutyl ketone, butyl acetate, tetrahydrofuran, acetone, isopropanol, ethyl acetate, methylene chloride, chloroform, carbon tetrachloride, cyclohexane, hexane, dioxane, hexafluoroisopropanol, or a mixture of two or more thereof.

6. The coating composition of claim 1 further comprising an application solvent, which is selected from the group consisting of alcohols and ketones.

7. The coating composition according to claim 1 wherein the coating base is selected from the group consisting of an alkyd coating, a Type I urethane coating, and an unsaturated polyester coating.

8. The coating composition according to claim 1 wherein the coating base is a solvent-based paint and the fluoropolymer composition is added to the paint in an amount of 0.001 weight % to about 1 weight % on a dry weight basis of the fluoropolymer to the weight of the wet paint.

9. A method for treating a substrate with a coating composition comprising contacting the substrate with the coating composition of

any one of claims 1, 6, 7, or 8 and drying or curing the coating composition on the substrate.

10. A coated substrate wherein the substrate comprises a dried coating produced from a coating composition of any one of claims 1, 6, 7, or 8.

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1. A coating composition comprising a fluoropolymer composition and a coating base, wherein the fluoropolymer composition comprises a fluoropolymer and an organic solvent and further wherein the fluoropolymer comprises repeating units in any sequence of polymer units:

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III: $[CCl_2—CH_2]_c$ —

IV: $[R^1—O—C(O)—C(CH_3)—CH_2]_d$ —

V: $[R^1—O—C(O)—CH—CH_2]_e$ —

VI: $[R^2—Y—C(O)—CT\text{-}CH_2]_g$

wherein

R_f is a straight or branched perfluoroalkyl group having 2-6 carbon atoms which is optionally interrupted by at least one oxygen atom;

X is an organic divalent linking group having from 1 to 20 carbon atoms selected from straight chain, branched chain or cyclic structures of alkylene, arylene, aralkylene, sulfonyl, sulfoxy, sulfonamido, carbonamido, carbonyloxy, urethanylene, ureylene, or combinations thereof, and optionally containing a triazole, oxygen, nitrogen, or sulfur, or a combination thereof;

Y is O, S or N(R) wherein R is H or C_1 to C_{20} alkyl;

Z is a straight or branched alkyl group having from 1 to 4 carbon atoms, or halide;

R^1 is a straight or branched alkyl group having from 12 to 22 carbon atoms;

a is a positive integer;

b is a zero or positive integer;

c is a positive integer;

d is a positive integer;

e is a zero or positive integer;

g is zero or a positive integer;

T is H, a straight, branched or cyclic alkyl group having from about 1 to about 10 carbon atoms, or halide;

R^2 is H, C_nH_{2n+1}, C_nH_{2n-1}, C_mH_{2m}—$CH(O)CH_2$, $[CH_2CH_2O]_pR^3$, $[CH_2CH(CH_3)O]_pR^3$, $[C_mH_{2m}]N(R^3)_2$;

n is from 8 to 40;

m is 1 to 40;

each R^3 is independently H, CH_2OH or C_qH_{2q+1};

p is 1 to 200;

q is 0 to 40; and

provided that

1) repeating unit I, $[R_f—X—Y—C(O)—CZ—CH_2]_a$ — , is present in the fluoropolymer at a minimum of 30% by weight of the fluoropolymer,

2) repeating units I, II and III, $[R_f—X—Y—C(O)—CZ—CH_2]_a$— , $[R_f—X—Y—C(O)—CH\text{-}CH_2]_b$— and $[CCl_2—CH_2]_c$— are present at a minimum combined total of 50% by weight of the fluoropolymer; and

3) the total of all repeating units, I – VI plus any optional monomers equals 100% by weight of the fluoropolymer.

2. The coating composition according to claim 1 wherein R_f is C_6F_{13}—, and is a straight or branched alkyl, or a combination thereof.

3. The coating composition according to claim 1 wherein the subscripts a, c, and d are each independently from 1 to 10,000 and wherein the subscripts b, e, g and h are each independently from 0 to 10,000.

4. The coating composition according to claim 1 wherein R^1 is stearyl (octadecyl), $CH_3(CH_2)_{17}$, and wherein R^2 is an alkyl group containing 8 to 20 carbon atoms.

5. The coating composition according to claim 1 wherein the organic solvent is methyl isobutyl ketone, butyl acetate, tetrahydrofuran, acetone, isopropanol, ethyl acetate, methylene chloride, chloroform, carbon tetrachloride, cyclohexane, hexane, dioxane, hexafluoroisopropanol, or a mixture of two or more thereof.

6. The coating composition of claim 1 further comprising an application solvent, which is selected from the group consisting of alcohols and ketones.

7. The coating composition according to claim 1 wherein the coating base is selected from the group consisting of an alkyd coating, a Type I urethane coating, and an unsaturated polyester coating.

8. The coating composition according to claim 1 wherein the coating base is a solvent-based paint and the fluoropolymer composition is added to the paint in an amount of 0.001 weight % to 1 weight % on a dry weight basis of the fluoropolymer to the weight of the wet paint.

9. A method for treating a substrate with a coating composition comprising contacting the substrate with the coating composition of any one of claims 1, 6, 7, or 8 and drying or curing the coating composition on the substrate.

10. A coated substrate wherein the substrate comprises a dried coating produced from a coating composition of any one of claims 1, 6, 7, or 8.